

Lesson 6

Audio Tutor 1/20 Listen and Understand

Terminating and Repeating Decimals

Objective Express fractions as either terminating or repeating decimals.

Vocabulary

terminating decimal

repeating decimal

Learn About It

In a recent year, the Denver Mint produced $\frac{21}{40}$ of all U. S. coins made that year. The Philadelphia Mint produced $\frac{3}{11}$ of all coins minted. Which mint produced more coins?

To solve the problem, you can compare fractions by changing each fraction to a decimal. To change a fraction to a decimal, divide the numerator by the denominator.



The "P" on the coin shows that it was minted in Philadelphia.



The "D" on the coin shows that it was minted in Denver.

Write $\frac{21}{40}$ as a decimal.

$$\frac{21}{40} = 21 \div 40$$

$$\begin{array}{r} 0.525 \\ 40 \overline{)21.000} \\ \underline{-20\ 0} \\ 1\ 00 \\ \underline{-80} \\ 200 \\ \underline{-200} \\ 0 \end{array}$$

You can end the division when there is a remainder of zero. This decimal is called a **terminating decimal**.

$$\frac{21}{40} = 0.525$$

Write $\frac{3}{11}$ as a decimal.

$$\frac{3}{11} = 3 \div 11$$

$$\begin{array}{r} 0.2727 \dots \\ 11 \overline{)3.0000 \dots} \\ \underline{-2\ 2} \\ 80 \\ \underline{-77} \\ 30 \\ \underline{-22} \\ 80 \\ \underline{-77} \\ 3 \end{array}$$

The division does not end with a remainder of zero. The digits 2 and 7 repeat in the quotient. This decimal is called a **repeating decimal**.

A bar is usually placed above the repeating digits.

$$\frac{3}{11} = 0.\overline{27}$$

Solution: Compare. $0.525 > 0.\overline{27}$, so $\frac{21}{40} > \frac{3}{11}$. The Denver Mint produced more coins than the Philadelphia Mint.

Guided Practice

Write each fraction as a decimal. If the decimal is a repeating decimal, use a bar to show repeating digits.

1. $\frac{5}{12}$

2. $\frac{4}{6}$

3. $\frac{3}{4}$

4. $\frac{1}{11}$

5. $\frac{2}{9}$

6. $\frac{4}{5}$

7. $\frac{10}{90}$

8. $\frac{4}{25}$

Ask Yourself

- Did I stop dividing too soon?
- Did I place a bar over all the repeating digits?

Explain Your Thinking ▶ Do $0.23\overline{888}$, $0.23\overline{88}$, and $0.23\overline{8}$ name different repeating decimals? Explain.

Practice and Problem Solving

Write each fraction as a decimal. Use a bar as needed.

9. $\frac{3}{5}$

10. $\frac{3}{10}$

11. $\frac{9}{11}$

12. $\frac{5}{6}$

13. $\frac{1}{3}$

14. $\frac{3}{8}$

15. $\frac{7}{11}$

16. $\frac{1}{2}$

17. $\frac{2}{3}$

18. $\frac{7}{8}$

19. $\frac{1}{12}$

20. $\frac{1}{8}$

21. $\frac{5}{9}$

22. $\frac{1}{6}$

23. $\frac{6}{8}$

24. $\frac{1}{4}$

25. $\frac{5}{8}$

26. $\frac{4}{11}$

Solve.

27. The Denver mint is expected to produce about $\frac{11}{19}$ of all the 50-cent coins that will be made in the year 2005. Write this fraction as a decimal, then as a percent.

29. Suppose the sales tax in a state is 0.075 per dollar spent. Victor wants to buy a coin set that costs \$18.95. What is the amount of tax that Victor will have to pay?

28. **Reasoning** About $\frac{6}{11}$ of the students visiting the mint bought souvenirs. Write this fraction as a decimal rounded to the nearest hundredth.

30. Magda collects state quarters. Of her quarters, 0.6 were minted in Philadelphia. The others were minted in Denver. If she has 18 quarters in all, how many were minted in Denver?

Mixed Review and Test Prep

Open Response

Find each product or quotient. (Ch. 6, Lessons 2 and 4)

31. $\frac{5}{8} \times \frac{4}{9}$

32. $25 \div \frac{5}{6}$

33. $28 \times \frac{3}{4}$

34. $6 \div \frac{3}{10}$

35. $\frac{5}{9} \times 27$

36. $\frac{2}{3} \div \frac{3}{4}$

37. Predict which denominators between 1 and 20 will most likely result in terminating decimals. Explain your prediction. (Ch. 7, Lesson 6)

Extra Practice See page 171, Set E.

Terminating and Repeating Decimals

Write each fraction as a decimal. Use a bar as needed.

1. $\frac{9}{20}$ _____ 2. $\frac{3}{10}$ _____ 3. $\frac{7}{12}$ _____

4. $\frac{4}{5}$ _____ 5. $\frac{2}{3}$ _____ 6. $\frac{5}{6}$ _____

7. $\frac{1}{6}$ _____ 8. $\frac{15}{16}$ _____ 9. $\frac{2}{15}$ _____

10. $\frac{4}{11}$ _____ 11. $\frac{5}{8}$ _____ 12. $\frac{13}{16}$ _____

13. $\frac{3}{25}$ _____ 14. $\frac{4}{9}$ _____ 15. $\frac{8}{9}$ _____

16. $\frac{11}{16}$ _____ 17. $\frac{14}{25}$ _____ 18. $\frac{11}{15}$ _____

Test Prep

19. Which of the following is the decimal equivalent for $\frac{14}{15}$?

- A 0.9
- B 0.93
- C 0.933
- D $0.9\bar{3}$

20. Is $\frac{1}{32}$ a repeating decimal or a terminating decimal? How do you know?

Terminating and Repeating Decimals

Write $\frac{3}{8}$ as a decimal.

$$\frac{3}{8} = 3 \div 8$$

$$\begin{array}{r} 0.375 \\ 8 \overline{)3.000} \\ \underline{-24} \\ 60 \\ \underline{-56} \\ 40 \\ \underline{-40} \\ 0 \end{array}$$

$$\frac{3}{8} = 0.375$$

Write $\frac{4}{9}$ as a decimal.

$$\frac{4}{9} = 4 \div 9$$

$$\begin{array}{r} 0.444\dots \\ 9 \overline{)4.000\dots} \\ \underline{-36} \\ 40 \\ \underline{-36} \\ 40 \\ \underline{-36} \\ 4 \end{array}$$

$$\frac{4}{9} = 0.\overline{4}$$

Write each fraction as a decimal. Use a bar as needed.

1. $\frac{34}{100}$

2. $\frac{23}{50}$

3. $\frac{6}{8}$

4. $\frac{1}{3}$

5. $\frac{7}{11}$

6. $\frac{21}{81}$

7. $\frac{3}{16}$

8. $\frac{7}{20}$

Problem Solving

Show Your Work

9. Bud took 40 foul shots and made 24 of them. What decimal shows the portion of his shots that Bud did not make?
